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Clinicopathological Correlation of Prostatic Lesions with Serum PSA Levels: An Observational Analysis

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ABSTRACT

Background: Prostatic diseases, including benign prostatic hyperplasia (BPH), prostatitis, and carcinoma, are common in elderly males and contribute significantly to morbidity. Serum prostate-specific antigen (PSA) is widely used as a diagnostic and monitoring tool, though its specificity for malignancy is limited.

Purpose: To evaluate the clinicopathological correlation of various prostatic lesions with serum PSA levels and age distribution.

Methods: This observational study was conducted in the Department of Pathology at a tertiary care center in Nashik from August 2019 to December 2021. A total of 110 prostatic specimens, including TURP chips, needle biopsies, and open prostatectomy specimens, were analyzed. Histopathological examination, Gleason grading, and serum PSA measurement were performed. Data were analyzed using EpiInfo 7.2, with $p < 0.05$ considered statistically significant.

Results: Among 110 specimens, TURP was most frequent (68.18%), followed by needle biopsy (26.36%) and open prostatectomy (5.45%). BPH was the predominant lesion (76.36%), while carcinoma accounted for 17.27% of cases. The 61–70-year age group had the highest incidence of both benign and malignant lesions (46.36%). Mean serum PSA was significantly higher in malignant lesions (89.82 ± 52.32 ng/ml) and atypical small acinar proliferation (54.93 ± 65.08 ng/ml) compared to BPH and PIN (7.56 ± 12.38 ng/ml). Gleason scores 7 and 8 were most frequent among carcinoma cases (31.57% and 31.57%, respectively).

Conclusion: BPH is the most common prostatic lesion in elderly males, while PSA levels correlate strongly with malignancy and atypical lesions. Histopathological evaluation and Gleason scoring remain essential for diagnosis and management.

1. Introduction

The prostate is one of the most commonly affected organs in elderly males and contributes significantly to morbidity and mortality. It is a pear-shaped glandular organ weighing up to 20 g, situated in the retroperitoneal space, encircling the bladder neck and urethra (Tavethiya, 2025). As an exocrine gland, it plays a vital role in producing a substantial portion of seminal fluid. The prostatic parenchyma of the mature male can be separated into four different areas which are anatomically distinct: the peripheral, central, transition, and periurethral zones. Benign prostatic hyperplasia (BPH), prostatitis, and carcinoma are among the most common diseases of the prostate (Rajani *et al.*, 2020). BPH is mainly a transition zone condition, while cancer tends to be found in the peripheral zone (Sharma *et al.*, 2017). BPH predominantly affects older males over 50 years of age and has a very pronounced ethnic and geographical variation of prevalence and mortality (Cotran *et al.*, 1999). The gold standard treatment for BPH is transurethral resection of the prostate. Various methods for the detection of prostatic malignancy include prostate-specific antigen (PSA) measurement in serum, transrectal ultrasound, magnetic resonance imaging, and tru-cut needle biopsy (Muthuvel *et al.*, 2018).

Prostate carcinoma visual grading Gleason system reflects the degree of tumor differentiation and stage of the tumor was introduced by Gleason. This system, on the basis of light microscopy, assesses the relationship of the stroma

to the neoplastic tissue and the patterns of organization and size of the cells. The Gleason system classifies prostate cancer into five architectural patterns, assigning the most predominant pattern as the primary grade and the next most common pattern as the secondary grade. The rating from 1 (most differentiated) to 5 (least differentiated) is used, and the sum of Gleason grade 1 and 2 makes up the Gleason score. In the case of a single pattern tumor, the Gleason score is the pattern grade multiplied by two (Deshmukh *et al.*, 2014). Prostate-specific antigen (PSA) is produced by the epithelial cells of the prostate (Sabalpara *et al.*, 2019). PSA serves as a key and clinically valuable biomarker for assessing prostatic disorders. Although the normal serum PSA concentration is typically below 4 ng/ml, its reference range tends to increase with advancing age. PSA is not exclusively tumor-specific, as elevated levels may be observed in both benign and malignant prostatic conditions; however, the rise is generally more pronounced in malignancies. Various pathological processes that compromise cellular integrity can result in the leakage of PSA into the bloodstream. Such cellular damage may occur secondary to bacterial infections, prostatic infarction, or neoplastic transformation (Pushpa *et al.*, 2024).

The current research is aimed at assessing the age distribution of patients with both benign and malignant lesions of the prostate. While doing so, it further aims to delineate the histopathological alterations in the prostatic tissue and to establish the relationship of serum PSA levels with the various types of prostatic lesions.

2. Methodology

2.1. Study Design

The present study was a prospective, observational, and single-centric study that was conducted at the institute, in the Department of Pathology, from August 2019 to December 2021. Over the study duration, a total of 110 specimens were analyzed. The prostatic specimens available at the department during the study period were included in the study. Exclusion criteria involved the autolyzed samples and inadequate biopsies or specimens from patients previously diagnosed with malignancy. The present study was approved by the Institute Ethics Committee (Letter No. MVPS/Dr.VPMCH&RC/IEC/30 dated 06/01/2019) and was conducted in accordance with the Declaration of Helsinki.

2.2. Study Protocol

Prostatic specimens of TURP chips, tru-cut biopsies, and prostatectomy specimens were collected. Each specimen underwent a detailed gross examination. Specimens were fixed in 10% neutral buffered formalin for 12–24 hours, followed by routine processing into paraffin blocks. Sections of 4–5 µm thickness were cut from these blocks and stained with Hematoxylin and Eosin (H&E). Histopathological examination was performed under a light microscope. Relevant clinical information was obtained from the requisition forms submitted along with the specimens. The findings were analyzed with respect to specimen type, patient age, histopathological pattern, final diagnosis, Gleason score, and serum PSA values.

2.3. Histologic Diagnosis and Grading

Specimens were classified as benign or malignant and correlated with serum PSA levels. The diagnosis of prostatic adenocarcinoma was based on glandular architecture, loss of basal cells, and nuclear features of glandular lining cells. Adenocarcinomas were graded using the Gleason scoring system. The Gleason score is the sum of the primary (most prevalent) and secondary (second most prevalent) grades. In cases with a single pattern, the same grade was assigned for both primary and secondary patterns (e.g., 3+3=6). Gleason grade groups were as follows: 3+3=6; 3+4=7; 4+3=7; 8 (3+5, 4+4, 5+3); ≥9 (4+5, 5+4, 5+5). Treatment decisions were made considering the highest Gleason score in each patient (Deshmukh *et al.*, 2014; Humphrey, 2017).

2.4. Statistical Analysis

Data were analyzed using EpiInfo software for Windows, version 7.2 (freely available from the CDC). Results were expressed as numerical values and percentages. Quantitative data were presented as Mean ± SD. A p-value of <0.05 was considered statistically significant.

3. Results

Among the 110 prostate specimens analyzed, the majority were obtained via Transurethral Resection of the Prostate (TURP), accounting for 68.18% of cases. Needle biopsies comprised 26.36% of specimens, while open prostatectomy specimens were the least common, representing 5.45% of cases. This indicates that TURP was the predominant method for obtaining prostate tissue in the studied population. Out of 110 prostate specimens, the majority were TURP samples (68.18%), followed by needle biopsies (26.36%) and open prostatectomy specimens (5.45%). Benign prostatic hyperplasia (BPH) was the most frequent finding, observed in 76.36% of cases, predominantly in TURP specimens (60%). Malignant lesions accounted for 17.27% of all cases, with TURP and needle biopsy contributing 6.36% and 10.91%, respectively. ASAP (atypical small acinar proliferation) and PIN (prostatic intraepithelial neoplasia)

were less common, representing 3.64% and 2.73% of cases, respectively. This distribution highlights that TURP was the main source of benign tissue, while needle biopsy played a key role in detecting malignancy (Table 1).

Table 1: Histopathological Distribution of Prostate Specimens by Type (n = 110)

Type of specimen	BPH	ASAP	PIN	Malignant	Total
TURP	66 (60%)	0	2 (1.82%)	07 (6.36%)	75 (68.18%)
Needle Biopsy	12 (10.91%)	4 (3.64%)	1 (0.91%)	12 (10.91%)	29 (26.36%)
Open Prostatectomy	06 (5.45%)	0	0	0	06 (5.45%)
Total	84 (76.36%)	4 (3.64%)	3 (2.73%)	19 (17.27%)	110 (100%)

The age of patients ranged from 50 to 90 years, with the majority of prostate specimens obtained from individuals aged 61–70 years (51 cases, 46.36%). Benign prostatic hyperplasia (BPH) was most commonly observed in this age group (36 cases, 32.73%), followed by the 71–80 years group (28 cases, 25.45%). Malignant lesions were more frequent in patients over 60 years, particularly in the 61–70 years group (10 cases, 9.09%) and the 71–80 years group (5 cases, 4.55%). ASAP and PIN were relatively rare, accounting for 4 cases (3.64%) and 3 cases (2.73%), respectively, with most occurring in patients aged 61–70 years. Overall, BPH predominated across all age groups, while carcinoma incidence increased with advancing age (Table 2).

Table 2: Distribution of Histopathological Findings by Age Group in Prostate Specimens (n = 110)

Age Group (years)	BPH	ASAP	PIN	Carcinoma	Total
50–60	16 (14.55%)	0	1 (0.91%)	1 (0.91%)	18 (16.36%)
61–70	36 (32.73%)	3 (2.73%)	2 (1.82%)	10 (9.09%)	51 (46.36%)
71–80	28 (25.45%)	1 (0.91%)	0	5 (4.55%)	34 (30.91%)
81–90	4 (3.64%)	0	0	3 (2.73%)	7 (6.36%)
Total	84 (76.36%)	4 (3.64%)	3 (2.73%)	19 (17.27%)	110 (100%)

Among the 84 cases of benign prostatic hyperplasia (BPH), the majority (71 cases, 84.52%) showed no evidence of prostatitis. Prostatitis was observed in 13 cases (15.48%), with chronic prostatitis being the most common subtype (11 cases, 13.10%). Acute and granulomatous prostatitis were rare, each accounting for 1 case (1.19%). This indicates that BPH without associated inflammation is far more prevalent than BPH with prostatitis in the studied population (Table 3).

Table 3: Distribution of BPH Cases With and Without Prostatitis (n = 84)

BPH Condition	Sub-domain	No. of Cases	Percentage
BPH without prostatitis (n=71)		71	84.52%
BPH with prostatitis (n=13, 15.48%)	BPH with acute prostatitis	1	1.19%
	BPH with chronic prostatitis	11	13.10%
	BPH with granulomatous prostatitis	1	1.19%
Total		84	100%

The mean serum PSA levels varied significantly across different histopathological groups. Patients with malignant lesions had the highest mean PSA (89.82 ± 52.32 ng/ml), followed by ASAP (54.93 ± 65.08 ng/ml). BPH and PIN cases had lower mean PSA values (7.56 ± 12.38 ng/ml each). The overall mean PSA across all cases was 23.25 ± 40.43

ng/ml. These findings indicate that elevated PSA levels are more strongly associated with malignant and atypical lesions compared to benign conditions. Among the 84 BPH cases, nearly half (46.42%) had PSA levels within the 0–4 ng/ml range, with BPH without prostatitis showing a higher proportion in the 4.1–8 ng/ml range (53.85%). PSA levels above 20 ng/ml were predominantly observed in malignant cases (18/19, 94.7%). ASAP and PIN cases showed intermediate PSA elevations, mostly between 12.1–20 ng/ml. Overall, PSA levels tended to be higher in malignant and atypical lesions, while most benign cases had PSA below 12 ng/ml, reflecting the diagnostic value of PSA in differentiating benign from malignant prostate conditions (Table 4).

Table 4: Distribution of Serum PSA Levels Across Histopathological Groups (ng/ml)

PSA (ng/ml)	BPH with Prostatitis	BPH without Prostatitis	Total BPH	ASAP	PIN	Malignant	Total
0–4	36 (50.70%)	3 (23.08%)	39 (46.42%)	1 (25%)	0	0	40 (36.36%)
4.1–8	13 (18.31%)	7 53.85%)	20 (23.80%)	0	0	1 (5.26%)	21 (19.09%)
8.1–12	10 (14.08%)	0	10 (11.90%)	0	0	0	10 (9.09%)
12.1–16	7 (9.86%)	2 (15.38%)	9 (10.71%)	1 (25%)	1 (33.30%)	0	11 (10.00%)
16.1–20	3 (4.23%)	1 (7.69%)	4 (4.76%)	1 (25%)	1 (33.30%)	0	6 (5.45%)
>20.1	2 (2.82%)	0	2 (2.38%)	1 (25%)	1 (33.30%)	18 (94.70%)	22 (20.00%)
Total	71	13	84	4	3	19	110

Among the 19 malignant prostate cases, the most frequent Gleason scores were 7 (3 + 4) and 8 (3 + 5), each accounting for 31.57% of cases. A Gleason score of 6 (3 + 3) was observed in 4 cases (21.05%), while higher-grade tumors with scores of 9 (4 + 5) were seen in 3 cases (15.78%). No cases had a Gleason score of 10. This distribution indicates that the majority of malignant cases were of intermediate grade, with fewer high-grade tumors, reflecting a spectrum of histopathological aggressiveness in the studied population (Table 5).

Table 5: Distribution of Gleason Scores in Malignant Prostate Cases (n = 19)

Gleason Score	Pattern (Primary + Secondary)	No. of Cases	Percentage
6	3 + 3	4	21.05%
7	3 + 4	6	31.57%
	4 + 3		
8	3 + 5	6	31.57%
	4 + 4		
9	4 + 5	3	15.78%
	5 + 4		
10		0	0.0%
Total		19	100%

Histopathological examination of prostate specimens revealed a spectrum of benign, inflammatory, and malignant changes. Benign prostatic hyperplasia (BPH) was characterized by variable glandular and

stromal proliferation, as well as the presence of corpora amylacea (Figures 1a–1f). Chronic prostatitis cases demonstrated inflammatory infiltrates in the stroma, composed of lymphocytes, plasma cells, and histiocytes, while granulomatous prostatitis showed epithelioid cell granulomas with giant cells (Figures 1e–1h). Atypical small acinar proliferation (ASAP) was observed in select cases (Figure 1i). Malignant lesions displayed features of prostatic adenocarcinoma with varying Gleason scores ranging from 3 + 3 to 5 + 5, illustrating the spectrum from low- to high-grade tumors (Figures 1j–1o). Overall, the histopathology highlighted the predominance of BPH in benign cases, while PSA elevation and glandular atypia correlated with malignant and pre-malignant lesions.

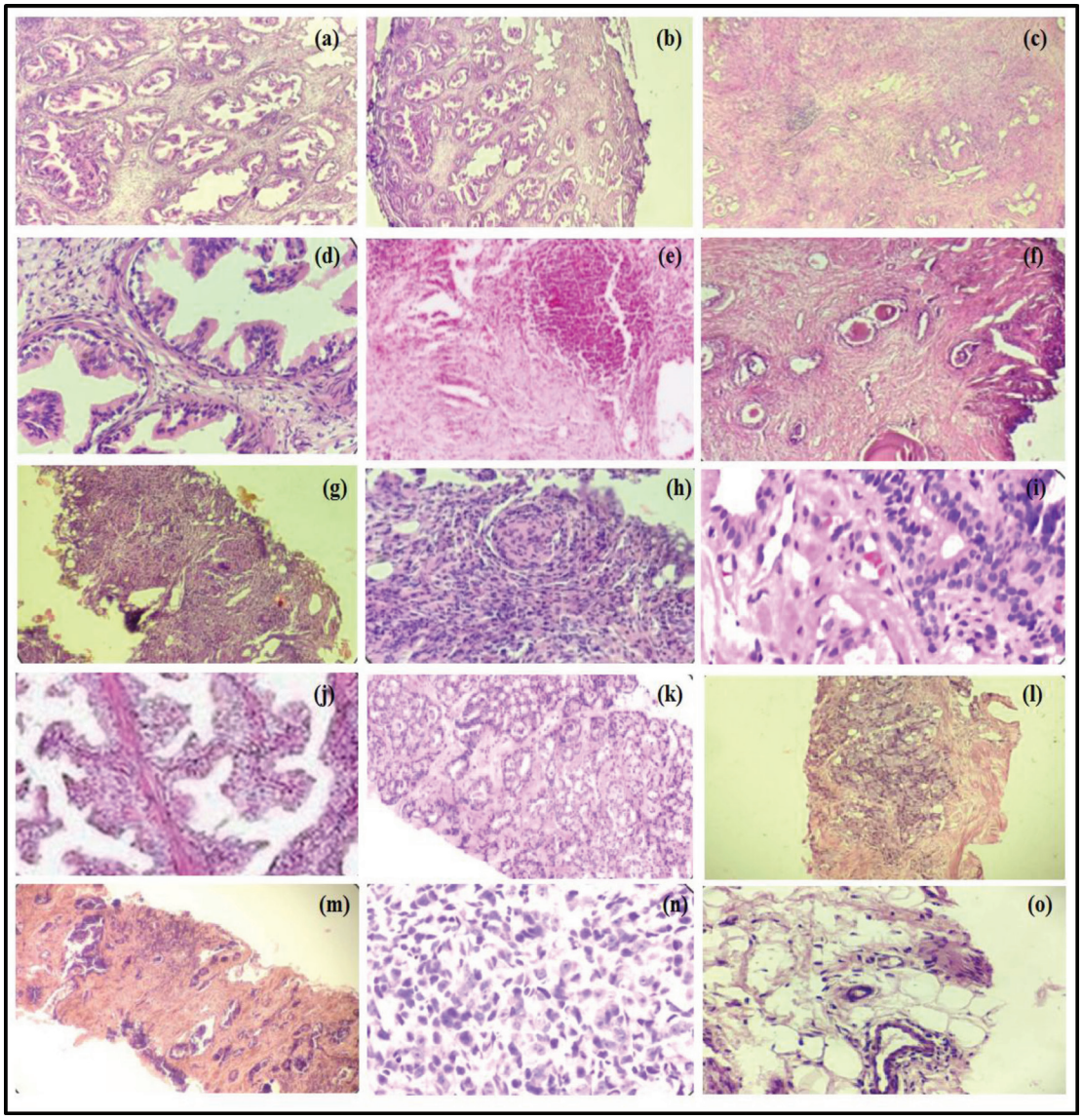

Figure 1: (a) BPH (H&E, 100X), (b) BPH With Glandular Proliferation (H&E, 400X), (c) BPH Showing Glandular Proliferation (H&E, 900X), (d) Benign Prostatic Hyperplasia Showing Stromal Proliferation (H&E, 40X), (e) Chronic Prostatitis Showing Inflammatory Infiltrate Composed of Lymphocytes, Plasma Cells and Histiocytes in Stroma (H&E, 100X), (f) BPH Showing Corpora Amylacea (H&E, 100X), (g) Granulomatous Prostatitis Showing Epithelioid Cell Granuloma and Giant Cells (H&E, 400X), (h) Chronic Prostatitis Showing Inflammatory Infiltrate Composed of Lymphocytes, Plasma Cells and Histiocytes in Stroma (H&E, 100X), (i) Atypical Small Acinar Proliferation (H&E, 100X), (j) Prostatic Adenocarcinoma With Gleason's Score 3+3 (H&E, 100X), (k) Prostatic Adenocarcinoma With Gleason's Score 3+3 (H&E, 100X), (l) Prostate Adenocarcinoma Gleason Score 3+4 (H&E, 100X), (m) Prostate Adenocarcinoma Gleason Score 4+3 (H&E, 100X), (n) Prostate Adenocarcinoma With Gleason Score 4+4 (H&E, 100X), and (o) Prostate Adenocarcinoma With Gleason Score 5+5 (H&E, 100X).

4. Discussion

Incidence of prostatic diseases increases in the geriatric age group. Most common prostatic lesions include benign nodular hyperplasia, inflammation, and tumors. In the present study, a total of 110 prostate specimens were analyzed. These comprised 75 (68.18%) TURP, 29 (26.36%) biopsies, and 6 (5.45%) open prostatectomy specimens. Similar findings about TURP specimens were depicted in studies done by Rajani *et al.* (62.5%) and Joshee *et al.* (62.5%) (Joshee & Sharma, 2015; Rajani *et al.*, 2020). Higher incidence of TURP specimens was observed by Satyasri *et al.* (318 TURP out of total 321 cases) and Puttaswamy *et al.* (88.7%) (Puttaswamy *et al.*, 2016; Satyasri *et al.*, 2018). There were 26.36% needle biopsies in our study, which correlates with the findings of Rajani *et al.* and Joshee *et al.*, who observed needle biopsy specimens as 37.5% and 29% of all prostatic specimens, respectively (Joshee & Sharma, 2015; Rajani *et al.*, 2020). Open prostatectomy specimens were 6 (5.45%), which is similar to the observation by Koshy *et al.* (5.3%) but in contrast with the findings of Satyasri *et al.* (0.3%) (Koshy & Bavikar, 2021; Satyasri *et al.*, 2018). In the present study, the majority of the cases were benign, 84 (76.36%), followed by 19 (17.27%) cases of carcinoma of the prostate, which is similar to the findings of Arshad *et al.* (Arshad & Ahmad, 2013). The most common prostatic lesion was benign prostatic hyperplasia, 84 (76.36%), which is similar to other studies by Puttaswamy *et al.* (80.6%), Koshy *et al.* (78.5%), and Hirachand *et al.* (74.22%) (Hirachand *et al.*, 2017; Koshy & Bavikar, 2021; Puttaswamy *et al.*, 2016).

The present study included patients from 50 to 90 years of age group. Maximum number of prostatic lesions, both benign and malignant, were seen in the 61 to 70 years age group, followed by 71 to 80 years. These findings are comparable to previous studies (Arya *et al.*, 2015; Yadav *et al.*, 2017). Maximum cases in the current study were of BPH (84 i.e., 32.73%), which were in the age group of 61–70 years, youngest patient being 50 years and oldest 85 years old, that are comparable to previous studies (Niang *et al.*, 2011; Yadav *et al.*, 2017). However, the study by Bhat *et al.* observed BPH frequently in 70–79 years old patients (Bhat *et al.*, 2015). Out of 19 prostate carcinoma cases, 10 (9.09%) were observed in the 61–70 years age group, youngest case being 60 years old and oldest 83 years old. Arya *et al.* observed prostate malignancies equal in 61–70 and 71–80 years of age group (Arya *et al.*, 2015). Garg *et al.* also observed prostate malignancies predominantly in the age group of 71–80 years, followed by 61 to 70 years (Garg *et al.*, 2013). Sharma *et al.* and Bhat *et al.* in their studies reported predominantly affected age group for prostate carcinoma as 70 to 80 years (Bhat *et al.*, 2015; Sharma *et al.*, 2017).

The most common prostatic lesion diagnosed on histopathology was benign prostatic hyperplasia, 84 (76.36%), which is similar to other studies by Puttaswamy *et al.* (80.6%), Koshy & Bavikar (78.5%), and Hirachand *et al.* (74.22%) (Hirachand *et al.*, 2017; Koshy & Bavikar, 2021; Puttaswamy *et al.*, 2016). In the current study, 1.19% cases of acute prostatitis and 13.09% of chronic prostatitis were noted. Earlier studies observed acute prostatitis in 3.8%, 4%, and 3.45% patients, while chronic prostatitis was noted in 6.9%, 24%, and 27.59% patients, respectively (Begum *et al.*, 2015; Londhe & Shah, 2018; Rajani *et al.*, 2020). The present study included a 1.19% case of granulomatous prostatitis. The current study observed a lower incidence of granulomatous prostatitis as compared with earlier findings (Begum *et al.*, 2015; Bhat *et al.*, 2015; Londhe & Shah, 2018).

In the present study, 3 cases of PIN were noted, constituting about 2.73% of the total cases. Higher number of cases were also observed in earlier studies with 10.16% and 12.29% as compared to the present study (Hirachand *et al.*, 2017; Mishra *et al.*, 2023). Incidence of PIN was also reported to be low (0.55%) (Garg *et al.*, 2013). In the present study, 19 out of 110 patients had prostate carcinoma, incidence being 17.27%, which was in concordance with earlier reports (Satyasri *et al.*, 2018; Vani *et al.*, 2015). As per studies by Joshee *et al.* (25%) and Arshad *et al.* (24.2%), the incidences of prostatic carcinoma were observed to be higher than the present study (Arshad & Ahmad, 2013; Joshee & Sharma, 2015), whereas lower incidence was also observed (Begum *et al.*, 2015; Sharma *et al.*, 2017). It was reported that adenocarcinoma was the main type of prostatic cancer, accounting for beyond 90% of all prostate malignancies, and androgenic hormones have major impact in development of prostatic carcinoma (Bhat *et al.*, 2015).

In the current study, perineural invasion was noted in 9 (8.18%) cases. Vani *et al.* observed perineural invasion in 11.8% patients (Vani *et al.*, 2015). Incidence of perineural invasion observed by Satyasri *et al.* and Garg *et al.* was 47.82% and 42.5%, respectively (Garg *et al.*, 2013; Satyasri *et al.*, 2018). Perineural invasion is considered as an indicator of prostate malignancy and a hallmark of prostatic carcinoma. In whole prostate glands, perineural invasion can be found, range in the literature being 84%–94% (Humphrey, 2017). Normal levels of serum PSA vary according to the age of the patient. The recommended upper limit of normal serum PSA levels correlated directly with age are as follows: 0–2.5 ng/mL for 40–49 years, 3.5 ng/mL for 50–59 years, 4.5 ng/mL for 60–69 years, and 6.5 ng/mL for 70–79 years. Other conditions which lead to raised PSA level are benign lesions like BPH, prostatitis, and even diagnostic and surgical procedures. These conditions may create confusion in diagnosis. Benign as well as malignant lesions can have

raised serum PSA value; however, rising values are more indicative of malignancy. Hence values of PSA alone should not be used as a marker of malignancy; instead, periodic estimation should be used as a screening tool in elderly men (Shekhar *et al.*, 2019).

In the present study, out of the total 84 benign cases, maximum 39 (46.42%) had serum PSA level in the range 0–4 ng/mL, 20 (23.80%) showed modest elevation in the range of 4.1–8 ng/mL, and 23 cases were in the range of 8.1–20 ng/mL. Two patients with benign lesions showed severe elevation in serum PSA level (>20 ng/mL) with values of 23.39 ng/mL and 109 ng/mL. Out of 19 malignant cases, maximum 18 (94.7%) cases had PSA levels >20 ng/mL, and only one case (5.26%) had PSA levels in the range of 4.1–8 ng/mL. Three cases each of ASAP and PIN had serum PSA levels in the range of 12 to >20 ng/mL. Study done by Akhtar *et al.* was in concordance with our study, with 11 (36.6%) benign cases having serum PSA level in the range 0–4 ng/mL, 9 (30%) in the range of 4–10 ng/mL, and 10 (33.3%) patients having serum PSA more than 10 ng/mL (Akhtar *et al.*, 2014). Study done by Shekhar *et al.* observed BPH with mild elevation of PSA 4–10 ng/mL in 61.73% cases; modest elevation 10.1–20 ng/mL in 11.11% cases, and marked elevation of PSA >20 ng/mL was seen in 3.70% cases, which is similar to our study (Shekhar *et al.*, 2019). Also, as per their study, mean PSA level of 15.19 ± 14.38 ng/mL was seen in prostatitis, and 3 PIN cases had serum PSA level >10 ng/mL (Shekhar *et al.*, 2019).

Accordingly, acute and chronic inflammation of the prostate is reported to be more commonly associated with high serum PSA levels (Nadler *et al.*, 1995). Moreover, BPH and prostatitis are associated with PSA elevation when the glandular epithelium is disrupted (Khiel *et al.*, 2001). Prostate needle biopsy causes a dramatic increase, and digital rectal examination causes a modest increase in serum PSA levels. Prostate-specific antigen is a good tumor marker for monitoring adenocarcinoma. It should not be used alone for the diagnosis of adenocarcinoma because it has less predictive value and is also elevated in benign hyperplastic conditions (Shekhar *et al.*, 2019). In earlier studies, 84.60% and 76.47% of cases had PSA levels >20 ng/ml, these findings being similar to our study (Shekhar *et al.*, 2019; Vani *et al.*, 2015). Maru *et al.* reported 23 (92%) malignant cases with serum PSA levels >10.0 ng/ml (Maru *et al.*, 2014). Mainali concluded that raised values of serum PSA are considered important for the diagnosis of carcinoma prostate. It can sometimes have low serum PSA levels; hence, it should be used for monitoring rather than diagnosis (Mainali *et al.*, 2018). We found Gleason score 7 and 8 (31.57%) as the most frequent, which is comparable to studies done by Satyasri *et al.* (Satyasri *et al.*, 2018).

Immunohistochemistry (IHC) serves as a valuable adjunct in the diagnostic evaluation of prostatic lesions. Basal cell markers such as 34βE12, cytokeratin 5/6, and p63 help identify the presence of basal cells, thereby aiding in distinguishing benign glands from invasive carcinoma (Hameed & Humphrey, 2005). AMACR (p504s) demonstrated a sensitivity of 96% and specificity of 95%, while p63 showed 100% sensitivity and specificity. Moreover, serum PSA levels were positively correlated with AMACR expression (Ramatlho *et al.*, 2025). Gami *et al.* also reported AMACR positivity in 42 (93.33%) cases of prostatic malignancy, underscoring its diagnostic relevance in differentiating cancerous from benign lesions (Gami *et al.*, 2025).

The present study provides a comprehensive histopathological evaluation of 110 prostatic specimens, correlating age, serum PSA levels, and Gleason scores. Its major strengths include systematic classification of lesions, inclusion of both benign and malignant cases, and an in-depth analysis of PSA variations across disease spectra. However, being a single-center, observational study with a relatively small sample size limits the generalizability of results. The rarity of certain lesions, such as granulomatous prostatitis and PIN, further restricts subgroup comparisons. Future multicentric studies with larger sample sizes and inclusion of molecular or immunohistochemical markers are recommended to validate and expand these findings.

5. Conclusion

The present study of prostatic lesions included Benign Prostatic Hyperplasia, Prostatitis, and Carcinoma. Non-neoplastic lesions were more common than neoplastic lesions, BPH being the most prevalent. The risk of prostate lesions increases with advancing age in males, more frequently noted between 61 to 70 years of age group. Adenocarcinoma was the most common prostate malignancy in the present study. The most common sample received for histopathology study is TURP. It is much helpful in diagnosing premalignant lesions as well as in early detection of cancer for better outcomes of patients. Histopathology study is mandatory to diagnose prostatic malignancy. PSA is a useful screening test for prostate carcinoma. Increased PSA levels can be seen in benign and malignant lesions, rising values being more indicative of malignancy.

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Authorship Contribution

Pooja Khandwe, Sheela Chikhalikar, Dimple Kalsi, and Archana Patil were involved in the designing of the study,

enrollment of the patients, collection of data, statistical analysis, and drafting of the manuscript. All authors have approved the submitted version and have agreed to be personally accountable for their own contributions, and to ensure that questions related to the accuracy or integrity of any part of the work, even ones in which the author was not personally involved, are appropriately investigated, resolved, and the resolution documented in the literature.

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Ethical Approvals

The present study has been approved by the Institute Ethics Committee of Dr. Vasantrao Pawar Medical College, Hospital and Research Centre, Adgaon, Nashik, India (Letter No. MVPS/Dr.VPMCH&RC/IEC/30 dated 06/01/2019) and was conducted in accordance with the Declaration of Helsinki.

Declarations

The authors declare that they have followed all ethical standards in conducting this research. All data supporting the findings are available within the manuscript

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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